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ABSTRACT

A collection of articles about the controversial use of paraquat (a toxic herbicide) in marijuana eradication programs is presented. Using a question-and-answer format, article 1 presents interviews with experts on all sides of the controversy, focusing on the legal, social, physiological, and ecological implications of the paraquat debate. Article 2 reports on intentions by the United States Drug Enforcement Administration to use the toxic herbicide against marijuana crops in the U.S. The third article discusses the possibility of using niacin to reduce the toxic effects of paraquat. Article 4 presents a final report by the National Institute on Drug Abuse concerning paraquat hazards. The report gives background information, a comparison of marijuana and tobacco, and the results of their study on the contamination of marijuana with paraquat. The final article discusses potential lung damage associated with the use of paraquat-contaminated marijuana. (LH)

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# Do It Now Foundation
# Specialized Information Service

# Paraquat

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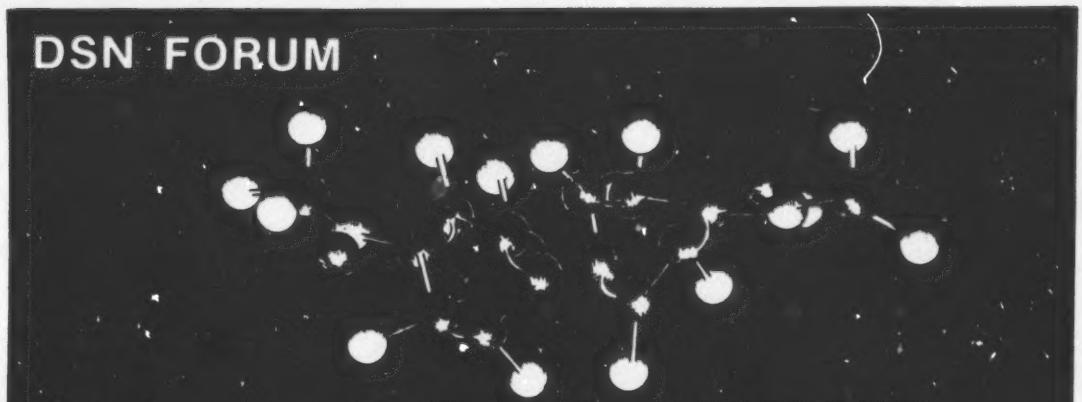
DSN FORUM



# PARAQUAT RECONSIDERED

**Editor's Note**

*The storm of controversy which accompanied the debate over U.S. support for marijuana eradication programs involving the herbicide paraquat subsided permanently, most thought with the Percy Amendment to the Foreign Assistance Act of 1978, which forbade continued U.S. funding of eradication programs involving the toxic herbicide.*

*Recently, legislation has been introduced in both houses of Congress which would renew U.S. support for paraquat programs — and soon, judging from the speed with which both bills cleared preliminary hurdles in committees and subcommittees.*

*The House bill, H.R. 2364, was introduced by Representative Billy Lee Evans (D-Ga.) as an amendment to the current Foreign Assistance Act. The main emphasis of the bill is to provide funds for the governments of marijuana-producing nations to implement eradication efforts in their countries.*

*On May 7, the bill cleared the House Foreign Affairs Committee after being approved unanimously by the Asian and Pacific Affairs and Inter-American Affairs subcommittees. The bill now goes to the full House, where it will be considered in weeks ahead as part of the complete Foreign Assistance Act.*

*In the Senate, similar legislation sponsored by Sens. Sam Nunn (D-Ga.) and Lawton Chiles (D-Fla.) quickly won the May 6 endorsement of the Foreign Relations Committee. Interestingly, the Foreign Relations Committee is chaired by Sen. Charles Percy, author of the original anti-paraquat amendment.*

*Due to the intensity of the debate which has surrounded the issue in the past, Drug Survival News contacted experts on all sides of the controversy to discuss the legal, social, psysiological, and ecolcgical implications of the paraquat debate.*

*Participants in the paraquat forum include Angie Hammock, press secretary and "narcotics advisor" for Congressman Evans. Ms. Hammock is active in the national parents movement and has been intrumental in organizing support among parents for the paraquat amendment. George Farnham is Political Director for the National Organization for the Reform of Marijuana Laws, and has consistently opposed U.S. sponsorship of eradication efforts involving paraquat. Dr. Renate Kimbrough, of the Center for Disease Control in Atlanta, is an internationally-acknowledged authority on paraquat toxicity.*

*The interviews were conducted by DSN Editor Jim Parker between April 10 and 16.*

*We recommend that all readers of Drug Survival News consider the merits of the arguments presented and contact their representatives in Congress to express their opinions on this important legislation. It's too important to ignore (Editorial Page 6).*

# "AS FAR AS I'M CONCERNED IT DOES AFFECT THE LUNGS AND IT'S TOXIC ..."

*DSN Interview with Dr. Renate Kimbrough, Medical Research Officer, Center for Disease Control, Atlanta GA.*

***DSN: Dr. Kimbrough, former HEW Secretary Califano issued a warning in 1978 that contaminated marijuana could lead to permanent or irreversible lung damage for regular and heavy users. Is that still an accurate statement in your opinion?***

RK: I cannot make any policy statement for HHS. The Center for Disease Control at the time was involved in providing information to HHS on the toxicity of paraquat. That information hasn't changed ... The same information that was available then is available now, and we have not done any additional work.

***DSN: Would you agree with the statement, then, that regular smoking of paraquat-contaminated marijuana could cause lung damage to the user?***

RK: You can't just say it that way. You have to qualify it. It depends on how much paraquat, how much comes through the smoke screen ... but there is that possibility.

We were not concerned at the time about any acute effects, that we might see people smoking one marijuana joint and something happening to them. That was never our concern and, unfortunately, some people understood it that way. Our concern was that paraquat ... if inhaled, even in very small concentrations, can cause lung damage. That was the question we were supposed to address. There are a lot of other questions and a lot of other concerns, but we were never involved in anything else, we were just to address the possibility of effects of paraquat on the lungs.

***DSN: How did the Center for Disease Control participate in the research into paraquat toxicity prior to the 1978 ban of U.S. funding of paraquat programs?***

RK: We did two things: We selected marijuana samples from areas of the country and analyzed them for paraquat. The proportions were higher in some areas than others ... We only collected these samples over a short period of time so we don't really have too much information on what you would get over a year. These samples were also collected after all the publicity, so we don't know whether the contaminated marijuana coming into the country at that time was lower because of all the publicity that had been

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**DSN Forum**
**Interview:**
**Renate Kimbrough**

generated ... The other thing that we did was to provide information about the toxicity of paraquat. Most of that was information from animal studies that had been done previously and some of that was my own work.

Then another group at HHS ... determined how much paraquat might come through the smoke from a marijuana joint. They made a number of measurements of that and, there again, it varies depending on how compact the joint is, whether they sprayed it (from the air) or whether they got marijuana that was actually sprayed in the field. There were a lot of variables. But they did demonstrate, though, that a certain amount of paraquat comes through the smokescreen.

***DSN: Fibrosis is one disease that is alleged to follow from smoking paraquat-contaminated marimarijuana. Do you see it as a realistic possibility?***

RK: That's what the final outcome would be, and that's what animals get, and this has been shown in people exposed to high levels of paraquat. This would be the end result. The lung damage caused by the chemical usually involves some hemorrhage, some breakdown of some cells in the lung, in certain areas. The only way the lungs can respond to that is healing, by producing a scar. The technical term for that is fibrosis.

***"The lung damage caused by the chemical usually involves some hemorrhage, some breakdown of cells in the lungs ..."***

***DSN: Would the risk of fibrosis increase with the steady accumulation of paraquat?***

RK: It's not just accumulation. Small amounts of paraquat are retained in the lungs over a longer period of time than in other organs. The other thing that paraquat apparently does is not so much the retention of the paraquat per se, but ... a cumulative toxic effect. In other words, you can produce an insult every day and eventually the number of insults will increase so that you will have an effect, but that doesn't necessarily mean that all of the paraquat is still in the lungs.

***DSN: So the toxicity of paraquat is a cumulative process.***

RK: Yes.

***DSN: Is it like carbon monoxide in the sense that a certain amount is retained in the body, lowering the threshold for future toxic reactions or other problems?***

RK: Yes, but that doesn't mean that all of the paraquat is retained in the lungs. A certain amount is also excreted every day.

Not all of the cumulative effects can be explained by the fact that paraquat is retained in the lungs. It is retained to some extent, but that's probably not the only reason for its cumulative toxicity.

***DSN: So even at very low dose levels over a protracted period of months or years, the dangers to marijuana smokers would increase.***

RK: Yes.

***DSN: Does paraquat change substantially in the process of being burned?***

RK: Yes. A large amount of paraquat that's on the leaves does change. One of the major breakdown products is a compound called 4 4(1) bipyridine. There's nothing known on its toxicity. I couldn't find anything on it. So we don't really know what that does.

***DSN: So essentially, it seems to me that you're saying there are more questions than answers at this time concerning the effects on human health of paraquat. Is that a reasonable assessment?***

RK: Yes, but of course we know that it is, at least in animals, toxic at very low dosage levels, particularly in the lungs.

**DSN: Could you say at this time that paraquat is harmless?**

RK: As far as I'm concerned it does affect the lungs and it is toxic and it does cause effects when put through the lungs at very low concentrations.

# "IT'LL BE JUST ONE OF THE MINUTE DETAILS OF THE FOREIGN ASSISTANCE ACT ..."

*DSN Interview with Angie Hammock, press secretary for Congressman Billy Lee Evans.*

***DSN: Why was the amendment to repeal the prohibition against funding eradication programs involving paraquat considered by the Asian and Pacific Affairs Subcommittee?***

AH: The bill that Congressman Evans and Congressman Ireland (D-FL) introduced was referred to the Foreign Affairs Committee because it amends the Foreign Assistance Act.

All of the subcommittees of the Foreign Affairs Committee have jurisdiction over the Foreign Assistance Act because it was an all-encompassing act — There were two subcommittees that had particular interest. One was the Asian and Pacific Affairs Subcommittee and the other was the Inter-American Subcommittee, which deals with most of Latin America. Both of those two subcommittees held a joint hearing on the Foreign Assistance Act. At one point, I don't even think they were going to look at the paraquat situation. We pressured them to look at the paraquat bill and after Congressman Evans testified for them they decided that maybe this was something they needed to look at further.

***DSN: What's the next step in gaining full House approval of the paraquat bill?***

AH: As I said, Asian and Pacific Affairs approved it unanimously yesterday. Inter-American Subcommittee approved it unanimously.

***DSN: What is the specific title of the paraquat bill?***

AH: The number title is H.R. 2364, but we're just referring to it as the "paraquat bill."

***DSN: Are there other major provisions bound up with the bill that might create problems in getting it passed in the full House?***

AH: The next step is getting the full Committee to look at the subcommittee's recommendations.

I think we're not going to have problems. Of course, there's always something that could come up, but I don't think so. I think it will be part of the recommendations. It'll just be one of the minute details of the Foreign Assistance Act.

This could go any way in the world.

Once it gets to the floor it'll have the unanimous recommendation of the Foreign Affairs Committee. It will be entitled the Foreign Assistance Act of 1981.

At this point, unless some industrious member of Congress says, "I find fault with this section," and starts a fight on the floor, it might just get passed *pro quo* no problem, as the Foreign Assistance Act.

***"I think it is clearly the single most important bill we could enact this year."***

But, if somebody starts making a problem with it, then who knows? It could go either way.

As far as there being other sections of the bill that would bog it down, that's entirely possible. I'm sure there's going to be problems on the floor because of aid to El Salvador.

But because it is a part of the Foreign Assistance Act, it's going to have to be expedited because they've got to approve a bill by May. You can't hold it down forever. It's got to go.

***DSN: Is there a similar measure before the Senate at this time?***

AH: Senator Nunn and Senator Chiles have introduced similar legislation. We don't feel that the legislation goes far enough, but it certainly is a step in the right direction and we endorse the measure.

I understand that Senator Percy who is now the Chairman of Foreign Affairs ... is going to let the Nunn-Chiles version out. And I feel like we've got strong enough support on the Senate side that it'll pass the Senate.

***DSN: Senator Percy originally opposed the use of paraquat because of the health hazards that were alleged to be associated with it. Has there been any concern regarding health hazards?***

AH: Congressman Evans chaired hearings last year in the 96th Congress on the health consequences of paraquat-contaminated marijuana to marijuana smokers in this country. His conclusion — and the unanimous conclusion of the entire Narcotics Committee — was that given the levels of contamination coming into this country, given the amount smoked by smokers and the amount reaching the lungs of the marijuana smoker, we do not feel that there is any possibility that there will be any serious damage. Naturally, if you eat paraquat you essentially are going to commit suicide.

***"Naturally, if you eat paraquat you are — essentially — going to commit suicide ..."***

But given the levels of contamination, we do not feel that it is a serious health threat.

***DSN: Can you give a basic explanation for DSN readers of why you and Congressman Evans consider the paraquat amendment to be necessary?***

AH: I think it is clearly the single most important bill that we could enact this year. Simply because marijuana is one of the number one drugs of abuse among adolescents and if we want to put a stop to marijuana coming into this country, we're going to have to stop it at the source country.

That is essentially Colombia, Jamaica, Bolivia, Mexico, and these countries need to go to an eradication program.

If we don't have this legislation, the United States will not be allowed to support this sort of move. Therefore, a lot of these countries will feel that it's a lack of commitment on behalf of the United States government and they, therefore, will not stick their necks out and go that final step.

***DSN: So you feel there is support among foreign governments for eradication programs?***

AH: Absolutely. This bill would not force them to go to an eradication program, it just allows them to. And Mexico has demonstrated their support for the program in that, even when U.S. funds were cut off, they continued the eradication program on their own, at their own expense. And we now see relatively little marijuana coming out of Mexico. It shifted the traffic over to Colombia. If we can do that same kind of thing in Colombia, imagine the impact we would have.

***DSN: Is foreign aid, in the context of this amendment, made contingent upon participation by foreign governments in a paraquat program? Are other forms of foreign aid dependent upon active participation in eradication efforts?***

AH: Congress last year appropriated $16

*(Continued on page 18)*



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## DSN Forum

## Interview: Angie Hammock

*(Continued from page 12)*

million to Colombia to fight the drug traffic coming into this country. We specifically put on that appropriation the limitation that said, "You cannot use this for an eradication program. You can only use it for interdiction, law enforcement, and the purchase of machinery and equipment, that sort of thing." The United States government has withdrawn any commitment to the eradication program. We are not funding any eradication programs. So if you're asking me if it has an effect on U.S. funding, yes, it does. But we're not trying to increase funding or decrease funding, we're simply trying to allow the Colombians and the Mexicans to make the decision for themselves. If the Colombians want to use part of that $16 million for eradication, which is *the* most cost-effective way of getting rid of marijuana, then they ought to be able to use it.

*Congressman Billy Lee Evans*

***DSN: There are no provisions for military aid or other forms of aid being contingent on foreign governments using paraquat to eradicate drug crops in their countries?***

AH: No. Quite the contrary. Because of the Percy amendment, there's no way we could have that kind of pressure on foreign governments. If the Percy Amendment is repealed, then conceivably ... if the United States State Department wanted to go to that sort of negotiating pressure, I can't say that's not possible in the future. I have no way of knowing ...

***DSN: Drug Enforcement Administration Chief Peter Bensinger called on members of the parents movement at the Southeast Drug Conference to rally behind the paraquat bill. Has much support for the paraquat amendment come from the parents movement?***

AH: Absolutely. Within three days' time, the Foreign Affairs Committee and several members of Congress received a deluge of telegrams and phone calls in support of this move.

***DSN: Within three days of the conference?***

AH: That's right, and it could not have originated in another place. There's no way. Because there's been relatively little publicity on the fact that the Foreign Affairs Committee was even holding hearings on this measure. And the telegrams and phone calls ... were coming from all over the country, so there is absolutely no way that it could have come up any other way.

***DSN: Can you give some idea of the weighing the hazards of a full-scale eradication program involving paraquat?***

AH: The State Department, the United Nations, the Center for Disease Control in Atlanta, and many scientists, chemists, who have done research, the Department of Agriculture have all looked into all methods of herbicidal eradication, and it is quite clear ... that paraquat is the safest, the most environmentally-pure. It's biodegradable, it does not cling to the soil or get into streams. It stays on the plant, it attaches itself to the leaves of the plant, and as I told you, Congressman Evans chaired the health consequences hearings, and we don't feel there's significant reason for concern for health consequences to the marijuana smokers. Therefore, time and time again, paraquat has proved to be the most environmentally-safe herbicide to use. It also is the most effective. It kills the plant within 48 hours, so therefore we feel ... measuring all the different variables here, paraquat is by far the best herbicide.

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97TH CONGRESS
1ST SESSION

# H. R. 2364

To repeal the prohibition contained in the Foreign Assistance Act of 1961 against the use of certain herbicides to eradicate marihuana by countries receiving assistance under that Act for international narcotics control, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MARCH 9, 1981

Mr. EVANS of Georgia (for himself and Mr. IRELAND) introduced the following bill, which was referred to the Committee on Foreign Affairs

## A BILL

To repeal the prohibition contained in the Foreign Assistance Act of 1961 against the use of certain herbicides to eradicate marihuana by countries receiving assistance under that Act for international narcotics control, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That (a) subsection (d) of section 481 of the Foreign Assistance Act of 1961 (22 U.S.C. 2291(d)) is repealed.

(b) Assistance provided from funds appropriated, before the enactment of this Act, to carry out section 481 of the

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Foreign Assistance Act of 1961 may be made available for purposes prohibited by subsection (d) of such section, as in effect immediately before the enactment of this Act.

(c) Funds appropriated for the fiscal year 1980 to carry out the purposes of section 481 of the Foreign Assistance Act of 1961 which were obligated for assistance for the Republic of Colombia may be used for purposes other than those set forth in section 482(a)(2) of that Act as in effect immediately before the enactment of the International Security and Development Cooperation Act of 1980.

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***DSN: Are you aware of a recent article in The Christian Science Monitor in which John Liddle, Chief of Toxicology, is quoted as saying, "I cannot say that paraquat is not harmful." Would you care to comment?***

AH: The Center for Disease Control is obviously not going to be able to say that it's not a harmful substance or that it's harmless any more than they can say that saccharin is harmless. What we determined in looking at their research, and holding hearings and calling them up to Washington, is that they take a series of worst-case assumptions. In other words, say the normal amount of contamination by paraquat coming into this country on marijuana is 50-60 parts per million. We heard testimony that there is not significant concern for damage until 10,000 parts per million. Obviously, the CDC is going to have to

***"Obviously the CDC is going to have to say, 'Yes, it's a harmful substance ...'"***

say, "yes, it's a harmful substance if you eat it or if you smoke it at 10,000 parts per million for a period of a year's time, day in, day out, if you have the same quantity of contamination, obviously there's going to be some harm to the lungs." But that's not a realistic analysis. We feel that they over-extrapolate their information. What they are saying that paraquat is harmful is true. There's no way we can deny that. We're not saying that it's *harmless*. We are saying that it's safe, given the quantities of contamination coming into this country.

## "SOME OF THEM ARE ALMOST GLEEFULLY TALKING ABOUT PARAQUAT-CONTAMINATED MARIJUANA ENDING UP IN THE UNITED STATES ..."

DSN Interview with George Farnham, Political Director, National Organization for the Reform of Marijuana Laws.

***DSN: What exactly is Norml position on marijuana eradication in general and paraquat programs in particular?***

GF: NORML is rather neutral, overall in terms of eradication programs. Our concern is the government programs. Obviously, marijuana is illegal and the government has the legal right, as defined by law, to go after marijuana, either in this country or in foreign countries at its source. If they're going to engage in such programs in foreign countries, they certainly should consider all the environmental ramifications and the foreign policy concerns, and obtain the foreign government's permission and things of that nature.

There are alternatives to herbicide spraying programs. That's what NORML is mainly concerned with, that the government consider the other alternatives, if they're going to go ahead with a program of this nature. For instance, in Mexico in the past, they would cut down the marijuana and burn it on the spot — which alleviates all the environmental concerns, because if the marijuana is burned there's no chance of it getting into the United States, which is the supposed purpose of the paraquat program. Some of the Congressmen and Senators seem to have lost sight of the fact that the purpose of the program is to eradicate marijuana at its source. Some of them are almost gleefully talking about paraquat-contaminated marijuana ending up in the

**"'If you're going to go in and do it, why don't you just firebomb the fields?"**

United States and potentially poisoning people so that it will act as a deterrent to marijuana use. That seems a far cry from the intent of the program to eradicate marijuana. NORML would wish that Congress would focus on the eradication issue rather than getting sidetracked into other issues, and that they'd use the most effective means of destroying marijuana that would also protect the health of all Americans.

***DSN: How did the current legislation to repeal the Percy Amendment get started?***

GF: It started back in January when Peter Bensinger, head of the Drug Enforcement Administration, went before several congressional committees and urged repeal of the Percy Amendment. There have been several congressmen and senators — primarily from the South, where there are serious problems and large-scale drug-smuggling — who have introduced amendments to repeal the Percy Amendment.

***DSN: What kind of support do you feel there is currently in the House and the Senate to repeal the Percy Amendment? Is it sufficiently strong to repeal?***

GF: NORML feels confident that once the paraquat debate is aired publicly again that the outrage against starting up another U.S. paraquat program in Colombia will be sufficient to preclude the Percy Amendment from being repealed. It has been voted by a House Subcommittee to repeal the amendment, but NORML is working on the entire House side now, on a floor fight if the amendment does get to the floor. More importantly, we're concentrating our efforts on the Senate. Senator Percy, who offered the amendment back in 1978, was then ranking minority member on the Foreign Relations Committee and, of course, with the Republicans in control of the Senate now, Senator Percy is the ranking majority member and the head of the Foreign Relations Committee. He has not indicated that he is willing to have this amendment repealed.

***DSN: The Percy Amendment called for a ban on U.S. support for paraquat-related eradication programs until such time as methods could be developed to adequately warn users that the marijuana is contaminated, is that correct?***

GF: Correct. There are two loopholes, ways to get around the block on U.S. financing of programs. One is for the State Department to ask the head of HHS, Secretary Schweiker, whether he believes that paraquat-contaminated marijuana would create a serious health hazard. The one time this section of the law was tested was in early 1979, when the State Department made that request to then-HEW Secretary Califano. Califano, in August, 1979, came back and said that paraquat posed a serious health hazard and could not be used in the program.

The other way to get around the Percy Amendment or to meet its criteria is to put a marker, either a dye or an odorant, in the paraquat spray itself so that marijuana would be very obviously contaminated to consumers, so that they would be alerted to the contamination. As we found out from the Mexican paraquat program, paraquat is odorless and tasteless. If the marijuana is immediately harvested, it is impossible to detect with the naked eye.

***DSN: Secretary Califano's warning in March of 1978, that contaminated marijuana could lead to permanent or irreversible lung damage in users, is still valid, then, as far as NORML is concerned?***

GF: Secretary Califano made his original statement in March of 1978. When the State Department, a year later, made the request for the possible use of paraquat in Mexico to continue that program, on August 9, 1979 Secretary Califano reiterated that smoking paraquat-contaminated marijuana would create a serious health hazard. Since then, the Center for Disease Control, the Environmental Protection Agency, and several other federal agencies have expressed their concern about the health hazards of using paraquat-contaminated marijuana.

***DSN: Is it true, as several proponents of the paraquat amendment have alleged, that Mexico has continued with the paraquat eradication program on their own, independent of U.S. support?***

GF: I'm not sure I'd say it is totally independent of U.S. support. One way the United States tried to get around the Percy Amendment in Mexico is that there is a dual

**"It took 10 to 15 years before we started to realize the serious problems that Agent Orange caused in Vietnam ..."**

eradication program in Mexico — one to use the herbicide 2,4-D to eradicate the opium poppy ... and the second is the paraquat program to eradicate marijuana. The Percy Amendment only cut off funding to programs that are used against marijuana. The United States rewrote the Executive Working Agreement with the government of Mexico to say that all funds in the program would only go

*(Continued on page 18)*

### DSN Forum

## Interview: George Farnham

*(Continued from page 13)*

to the opium poppy portion of the program and none of it to the marijuana portion. The same planes, the same helicopters, the same spraying equipment, the same personnel, are used in the opium poppy program as the paraquat program, but the U.S. position is they're only funding the opium poppy portion of the program. There is a very small amount of paraquat spraying still going on in Mexico, but Mexico has fallen from supplying 90% of the United States' marijuana in 1975 to supplying less than 10% in 1981.

The reason they can't use that to get around the Percy Amendment in Colombia is that Colombia only grows marijuana. They don't have the luxury of having two separate programs that they can combine and say that they are only funding one. Which is why they can't use the same methods that they were using in Mexico in the late 1970s.

In order to begin a paraquat spraying program in Colombia, it is necessary to repeal the Percy Amendment because the Percy Amendment has worked exactly as it was intended. When the State Department tried to use a dangerous herbicide (i.e., paraquat), they were denied that permission by Secretary of HEW Califano. They must be fairly concerned that Secretary of HHS Schweiker would also deny permission for use of paraquat, because all they had to do was ask him, and if he gives his permission, they can spray paraquat to their heart's content in Colombia.

***DSN: That's assuming that the Colombian government would choose to participate?***

GF: That raises another question and that is that President Turbay of Colombia has been adamant for the last three years that he has no interest in the paraquat spraying program in his country because he believes there are serious environmental dangers in spraying paraquat on a large scale throughout Northern Colombia. NORML has not heard of any evidence that President Turbay has changed his mind on the subject. More importantly, in President Reagan's fiscal year 1982 budget there's not one dime allocated for a paraquat spraying program in Colombia. NORML estimates that the overall cost of a paraquat program in Colombia would be upwards of about 250 million dollars. The Mexican

**DSN Forum**

## Interview: George Farnham

*(Continued from page 18)*

program cost 88 million dollars, but with inflation and the fact that marijuana is grown over a much larger section of Colombia than it was in Mexico and that Colombia does not have the resources — the helicopters, the fixed-wing aircraft, the infrared technology, the spraying equipment, the personnel and all the other costs of a paraquat program — it would probably cost up to 250 million dollars through the next three or four years to finance the program...

There are very serious and very dramatic differences in the government and how marijuana is grown in Mexico as compared to Colombia. In Mexico, it's grown in the Sierra Madres, mainly in an area where the government does not have control. There are certain guerilla groups that grow, or used to grow, marijuana on a large scale. They'd sell the marijuana for profit or more often, guns, that were used against the Mexican government. The Mexican government was delighted to go in and spray paraquat. It got rid of the income of the anti-government group ...

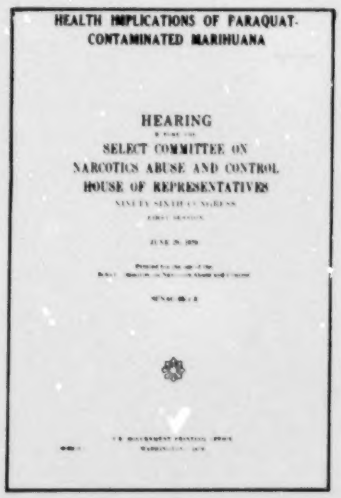
In Colombia, you have marijuana which is much more central to the overall Colombian economy. A much larger segment of the population makes their living off the marijuana industry. And President Turbay has been adamant that he will not allow a paraquat program in Colombia.

***DSN: Do you see the possibility of the legislation becoming bogged down because of any other factors? The legislation is included in the Foreign Assistance Act, which involves assistance to various world trouble spots, including El Salvador. Do you anticipate this factor showing any mass movement in Congress in favor of a paraquat amendment?***

GF: The whole budgetary process of the Foreign Assistance Act is very methodical and slow. At the moment, we've just had one House subcommittee vote on the issue. There will be many more times and forums for it to come up.

***DSN: There have been other suggestions that we use more immediately destructive means if we're going to be involved in eradication at all. Instead of using paraquat which destroys unattended marijuana in 48 hours, that we use something that destroys immediately, thus removing the danger of contamination.***

GF: I did this half-hour debate with (Congressman) Andy Ireland (D-FL) yesterday and one of the first phone calls that came in was from a guy who was outraged, and that was pretty much his statement: "I don't see why they spray paraquat. If you are going to go in and do it, why don't you just firebomb the fields?" I was a bit taken aback with the guy, but the point was that it seems a lot more valid to go in there and do something that's the least environmentally dangerous, not firebombing or napalming or anything, but ... if you're going to kill the marijuana you have to find something that's effective in killing it. If paraquat worked for the intended purpose that the congressmen claim it does — to kill marijuana in 48 hours — we wouldn't have had the problem with the Mexican program or the potential problem for the Colombian program of contaminated marijuana entering this country. So if they're going to use a herbicide, which NORML is opposed to, we would be most concerned that they find an effective herbicide which would kill the marijuana and, so far, paraquat has proved in the Mexican program to not be effective. And unless they can find a herbicide that is effective, NORML would strongly urge that they use alternative means of eradicating marijuana.


HEALTH IMPLICATIONS OF PARAQUAT-CONTAMINATED MARIHUANA

HEARING

SELECT COMMITTEE ON
NARCOTICS ABUSE AND CONTROL
HOUSE OF REPRESENTATIVES

***DSN: What's next for NORML in terms of blocking this legislation?***

GF: Probably the full Foreign Affairs Committee will hold hearings and NORML will try to testify at them. NORML was not permitted to testify at the subcommittee hearings, and I think that one of the reasons is that the evidence was so one-sided that opponents of the bill were not allowed to testify. That vote was so lopsided that the congressmen were really not informed on the issue and we will try and inform the entire Foreign Affairs Committee. If it gets past that, NORML is really gearing up towards defeating the paraquat amendment on the floor of the House, and if the House passes it, our best shot of all is in the Senate in the Foreign Relations Committee, which Senator Percy chairs.

***DSN: Most of the research on which Secretary Califano's warning and the Percy Amendment were based was performed in 1978 and 1979. Has any new research or information become available on paraquat?***

GF: There have been no new health experiments studies, reports since the National Institute on Drug Abuse, Health, Education and Welfare, and the Center for Disease Control came up with their studies in the summer of 1979. NORML is very concerned that there has never been a long-term study on the health effects of paraquat-contaminated marijuana. It took 10 to 15 years before we started to realize the serious problems that a herbicide used in Vietnam called Agent Orange was causing Americans exposed to it there. NORML's concerned that, in the late 1980s or early 1990s, we're going to start feeling the effects of the last paraquat program without knowing more about it.

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# Domestic Use of Paraquat Planned

The U.S. Drug Enforcement Administration intends to use the toxic herbicide paraquat against marijuana crops in this country, according to recent plans made public by the federal drug control agency.

The final remaining barrier prohibiting use of paraquat on domestic pot crops was removed recently with approval by the Environmental Protection Agency of DEA domestic eradication plans. The ruling follows legislation passed last year which reinstated U.S. funding of foreign marijuana eradication projects using the herbicide.

Concern over possible health effects of smoking paraquat-contaminated marijuana and uncertainty about the potential environmental hazards arising from large-scale use of the herbicide ignited a national controversy in 1978 following disclosure that U.S.-funded paraquat spraying programs had been carried out in Mexico from 1975 to 1978. The debate over paraquat was so great at that time that Congress blocked further funding for paraquat programs until questions about the safety of the herbicide could be fully resolved.

But questions regarding possible adverse effects on health, particularly the danger of fibrosis, a disease characterized by scarring of lung tissue, remain unanswered. And although the National Institute on Drug Abuse stated in its final 1978 report on the issue that "not a single case of fibrosis or other lung damage has ever been positively linked to smoking contaminated marijuana," a 1982 study by the National Academy of Sciences warns that clinical evidence to date "raises the serious possibility that continued exposure to inhaled paraquat is likely to be harmful to the lungs."

According to Al Heier, of the EPA Office of Public Affairs, the agency could not address possible health consequences of smoking contaminated marijuana because marijuana is not a registered crop subject to EPA toxicity regulations. "The only thing we were asked by DEA is 'can we legally use this compound?' and, actually, legally, it can be used," Heier told **DSN**. "We can't comment on the health effects. If it were used on a registered crop, we could comment."

Noting that most states consider cannabis a weed, a spokesman for the DEA told **DSN** that the federal drug control agency will provide funding and technical expertise to states wishing to institute paraquat spraying programs. "We're not going to be engaging in a national spraying program," he said, adding that use of the herbicide "should be an option" for states who find marijuana trafficking a problem.

Drug Survival News

November-December 1981

# Niacin Proposed as Paraquat Antidote

*by Mark Worden*

As the cliche goes, there's good news and there's bad news. First the bad news: There's every indication that paraquat spraying of marijuana will be resumed. That's the bad news.

The good news: Scientists have found that vitamin $B_3$ (niacin) reduces the toxic effects of paraquat.

Until recently there was no good antidote for paraquat poisoning. About the only thing a physician could do was to try to get the paraquat out of the body, a pretty difficult—if not impossible—task, especially when the paraquat has been consumed in the form of contaminated marijuana smoke.

A series of studies underway at the John M. Dalton Research Center at the University of Missouri may change all that. The studies, funded through the National Institute of Health, aim at a biochemical approach to paraquat detox. Since paraquat interferes with the synthesis of a vital enzyme containing niacin, scientists reasoned that niacin therapy might counteract some of the deleterious effects of paraquat on the enzyme system.

Dr. Olen Brown, professor of veterinary microbiology at the University of Missouri, says he is not a megavitamin therapist, but he *does* think that his research definitely shows the value of megavitamin therapy for paraquat poisoning. Dr. Brown's study (reported in the June 26 *Science*) points up the need for an antidote to paraquat poisoning: ". . . it has caused over 400 human deaths from accidental and suicidal ingestions... (and) paraquat has allegedly caused lung damage to drug users who smoked paraquat from Mexico. Human fatalities generally are caused by pulmonary impairment, regardless of method of contact."

Brown and his colleagues set up a research design consisting of two groups of rats poisoned with 30 mg (per kg body weight) of paraquat twice over a 24 hr period. Why rats? Dr. Brown told *Drug Survival News*: "There is a considerable amount of work which shows that rats are a reasonable model for this kind of study, in terms of what might be the effect in humans."

The findings were clear. The rats given 500 mg of niacin per kilogram body weight every 24 hours for five days showed delayed and reduced symptoms of paraquat poisoning. They did not get sick as quickly and their pulmonary difficulties were not as intense when compared with rats not receiving niacin. The animals treated with niacin also survived longer, and fewer of them succumbed to paraquat poisoning.

Niacin reduced paraquat toxicity in rats. What about humans? Although this therapy has not been used in clinical studies with humans, Dr. Brown is encouraged by the results. Says Dr. Brown, "Better survival and less toxicity, however, doesn't mean that niacin cures *all* the effects of paraquat poisoning. We have to presume that the paraquat has a complex set of effects that occur in living systems. We were very specifically trying to prevent *one* of those kinds of effects. We were successful in doing that as shown by biochemical data."

Brown also pointed out that the studies have applications beyond paraquat poisoning for use in similar classes of drugs, such as the anticancer drug adriamycin, which has a toxic side effect on the heart. Certain classes of antibiotics also have paraquat-like side effects, as does hyperbaric oxygen.

It should be noted that the rats in Brown's study were given extremely high doses of niacin. Translated into human terms, a 150 pound person (with high levels of paraquat poisoning) would have to take roughly 34 grams of niacin over a 24 hour period—for five days. "These kinds of doses have been given to humans," Brown said. "What we intend to do in the future is to reduce the size of the doses and explore dose-relationships. Niacin is a fairly nontoxic kind of substance. Some people experience minor difficulty with it—flushing and so on—at these levels. But we don't anticipate that such high levels would be needed, based on our theory. We simply wanted our first study to cover all the bases—to give the maximum amount of the vitamin that would undo the damage. It's a very high dose." Dr. Brown added that niacinamide—a form of niacin that does not produce flushing—could also work as an antidote.

NIDA Capsules

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## FINAL REPORT ON PARAQUAT HAZARDS

The National Institute on Drug Abuse has released a final report on paraquat contamination of marihuana which concludes that if a person smokes 5 marihuana cigarettes every day for 1 year, each cigarette containing 500 parts per million (ppm) of paraquat, permanent lung fibrosis could develop. Fibrosis is a condition which reduces the capacity of the lungs to absorb oxygen.

When the possible risks of paraquat are added to the pulmonary hazards of chronic marihuana use, the chance for severe consequences to the lungs increases.

Researchers have found that only a very small amount of paraquat is transferred from the marihuana leaf to the smoke--between 0.2 and 0.3%. From this, it can be estimated that a 1 gram marihuana cigarette contaminated at 500 ppm would produce smoke containing approximately 1 microgram of paraquat.

Animal studies have led researchers to conclude that if 1 microgram of paraquat is inhaled repeatedly without time between doses to permit repair of the damage to the lungs, permanent lung tissue damage may occur. The extent and degree of this damage would depend on the cumulative dose. In Environmental Protection Agency studies with hamsters, between 2.5 and 5 micrograms of inhaled paraquat produced adverse changes in the animal lungs after a single administration.

It should be noted, however, that to date no case of human poisoning from paraquat contaminated marihuana has been confirmed in the United States.

(more)

BACKGROUND

Paraquat is a herbicide which has been used by the Mexican Government to eradicate marihuana since 1975. It is sprayed by aircraft and interacts with sunlight to cause the plants to die within about 2 days. NIDA began analyzing marihuana from Mexico in 1977 when concern was raised that some marihuana entering the United States from Mexico might be contaminated.

One hundred samples of marihuana confiscated by the Drug Enforcement Administration near the Mexican border were analyzed. Only samples confiscated between October 1976 and August 1977 showed any contamination. Thirteen (or 20%) of the 61 samples confiscated during this period showed paraquat contamination ranging from 3 ppm to 2264 ppm, with the average sample containing almost 500 ppm.

Because the number of confiscated samples was small and not designed to be representative of the marihuana exported to the United States, these figures cannot be used to predict the total incidence of contaminated marihuana in the United States.

MARIHUANA AND TOBACCO

Studies comparing the harm of marihuana and tobacco have shown that the ability to exhale air was decreased more in chronic marihuana users (5 joints per week for several years) than chronic tobacco smokers (16 or more cigarettes per day for several years).

Also, the condensed smoke of marihuana contains a higher percentage of cancer-causing agents than tobacco. The tars from marihuana smoke have produced tumors in laboratory animals and can produce cancerous or precancerous changes when applied to animal skin.

# # #

March 9, 1978

National Institute on Drug Abuse

Contamination of Marihuana with Paraquat: Preliminary Report

Since 1975, the Mexican Government has operated a marihuana eradication program. The principal herbicide employed in this program is Paraquat (1,1' dimethyl-4,4' bipyridinium dichloride), a chemical patented in England and manufactured in this country and in Mexico. Paraquat is sprayed from aircraft onto marihuana plants, and the pesticide interacts with sunlight to cause the plants to die within the course of roughly forty-eight hours. This eradication program is operated and funded by the Mexican Government.

Paraquat has also been used in this country since the early 1960's for agricultural purposes. The most common use of Paraquat is as a means of cleaning the seedbed before planting crops, but it is also employed for such purposes as weed control in fruit orchards and as an aid in harvesting mature plants such as cotton and soybeans. Paraquat does not persist in the soil and presents little hazard when used in prescribed amounts. It is one of 23 herbicides which the Environmental Protection Agency (EPA) is proposing to restrict only to trained farmers and users. The use of Paraquat on food crops as a direct harvesting aid is not recommended by the EPA. Use in orchards for weed control can result in some contamination of the fruit, but this contamination must not exceed 0.05 ppm prior to marketing.



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Paraquat in concentrated form is highly toxic and has been responsible for at least 25 deaths in the United States due to accidental poisoning and suicides. It tends to concentrate in lung tissue whether it is ingested or inhaled. The toxic reaction with the lung produces a condition called fibrosis, which reduces the capacity of the lung to absorb oxygen. Inhalation of Paraquat creates a greater risk of lung damage than ingestion of an identical amount.

During the past year, concern has been expressed about the possibility that Paraquat-contaminated marihuana was entering the United States and might pose a health hazard to marihuana users.

Marihuana sprayed with Paraquat can be quickly harvested before the plant dies and in such cases harvested marihuana contaminated with Paraquat may find its way into this country. Roughly 60 percent of marihuana in this country is imported from Mexico.

As a result of this concern, a study was initiated last summer at the National Institute on Drug Abuse to answer two specific questions: (1) Is contaminated material entering the country in any significant amount; and (2) What are the chemical constituents of the smoke from Paraquat-contaminated marihuana which might create health risks beyond those presently associated with marihuana smoking.

STUDY RESULTS

These studies have provided the following data:

1. Sixty-three samples of marihuana confiscated by the Drug Enforcement Agency since October 1976 have been chemically analyzed for Paraquat. The average weight of the seizures from which these samples were taken was 699 lbs. All of the samples which were tested for Paraquat came from the Southwest United States, the area where contaminated samples are most likely to be found.

   Thirteen of these were unambiguously identified as contaminated with Paraquat. The contamination ranged from three to 2,264 parts per million (ppm), with an average contamination of 452 ppm. This level far exceeds the 0.05 ppm level that is tolerated for domestic uses. Since the sampling was not random in a statistical sense, no clear extrapolation of this data can be made to estimate the total amount or distribution of Paraquat-contaminated marihuana in the United States. No attempt was made to design a statistically valid random sample selection since the intent was only to answer the question of whether contaminated material was entering the country and the approximate level of its contamination.

2. Marihuana plant material which was treated with a Paraquat solution in order to produce a "contamination" level of approximately 10,000 ppm was burned in an appartus designed to collect all the smoke produced. This artificially high concentration was prepared to expedite the analytical procedures. The

apparatus is constructed of glass and allows the plant material to burn in an air atmosphere at a temperature similar to that of a marihuana cigarette. Although this method of burning is not exactly the way marihuana burns in a cigarette, it is sufficiently analogous to provide data which can be generally related to the real smoking situation.

The smoke was subjected to chemical analysis and it was determined that the major compound in the smoke resulting from the presence of Paraquat was a compound called bipyridine, which is formed from the chemical breakdown of Paraquat when it is burned. Bipyridine is a compound found in tobacco smoke, and is not itself likely to contribute significantly to the toxic effect of marihuana smoke.

However, it has also been determined that a small amount of Paraquat is carried in the smoke, although the exact amount of Paraquat resulting from the burning of plant material at a specific contamination level has not yet been determined. Efforts to obtain more exact determinations are in progress. However, rough estimates from the data in hand suggest that approximately 50 to 250 nanograms of Paraquat can be expected to be present in the smoke from a single marihuana joint contamined at 450 ppm Paraquat. Analysis is also being carried out on the smoke from

Mexican-variety marihuana grown at the United States Department of Agriculture and treated with Paraquat under simulated field conditions. Only when this analysis is complete will it be certain that the conclusions from the 10,000 ppm material discussed above are completely valid.

PRELIMINARY CONCLUSIONS

1. Considering the low-dose, chronic studies done in animals, it appears that the oral administration of marihuana treated with Paraquat (e.g., in brownies) probably creates little hazard. An individual would have to ingest approximately two full ounces of marihuana every day for two years (at contamination levels of 2,000 ppm) to reach the lowest dose level where cell damage has been observed in animals.)
2. Smoking marihuana containing Paraquat presents the greatest potential hazard. Studies of animal inhalation and of agricultural workers engaged in repeated spraying of Paraquat when taken into consideration with the marihuana smoke analysis studies suggest that there exists certain risks to the marihuana smoker.

First, heavy users of marihuana run a possible risk of fibrosis which could be clinically measureable if the marihuana they smoke is contaminated with Paraquat. A rough estimate can be made that an individual who smokes three to five marihuana cigarettes each day (1) could suffer measurable lung impairment after several months if the marihuana contained at least 450 ppm of Paraquat. (2) It is

less likely that clinically measurable damage could be suffered by individuals who consume marihuana in smaller quantities, less regularly, or with lower levels of Paraquat-contamination. These risks must be considered against the use patterns of marihuana in this country. Our surveys suggest that nearly nine million Americans have used marihuana over 100 times in their life.

Adverse lung effects of marihuana alone are documented in the scientific literature so Paraquat effects are potential additive consequences for the marihuana smoker. The permanent nature of the known marihuana effects are uncertain, but Paraquat effects, if they do occur, would be permanent, and this constitutes the significant added danger to the marihuana smoker.

There is no evidence at present that Paraquat is carcinogenic to lung tissues, but studies in this area are incomplete. Marihuana smoke is comparable to tobacco smoke in cancer-causing chemicals.

A final report of the technical details of these studies is expected to be ready within the next four to six weeks and will be provided to the Departments of State, Justice, and Agriculture, the Environmental Protection Agency, and the Office of Drug Abuse Policy.

For further questions contact Mary-Carol Kelly (301) 443-6245.

NIDA Capsules

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PARAQUAT: POTENTIAL LUNG DAMAGE

The Secretary of the Department of Health, Education, and Welfare issued a statement on March 12, 1978, cautioning heavy users of marihuana that some marihuana entering the United States from Mexico is contaminated with the herbicide Paraquat and that lung damage may develop from its use.

This statement was based on studies done by the National Institute on Drug Abuse (NIDA) at the request of the White House Office of Drug Abuse Policy.

The studies began with the analysis of some marihuana confiscated near the Mexican border by the United States Drug Enforcement Administration. Twenty-one percent of the samples tested (13 out of 63) were found to be contaminated with Paraquat at levels that ranged from 3 parts per million (ppm) to 2,264 ppm. The average sample contained about 450 ppm. The Environmental Protection Agency (EPA) allowable tolerance for Paraquat on fruit in the United States is .05 ppm.

After confirming that Paraquat-contaminated marihuana was entering this country, NIDA began studies to determine what effects the herbicide might have on marihuana users. In early December of 1977, NIDA stated that there was little risk from ingesting contaminated marihuana since it is estimated that a person would have to swallow several pounds within a few hours, or 2 full ounces every day for 2 years at contamination levels of 2,000 ppm to cause harm.

Analyses of smoking contaminated marihuana were completed last week. Based on numerous studies--involving farm workers using Paraquat, animals inhaling a Paraquat mist, and simulated laboratory experiments--NIDA estimated that there is a possibility that some lung damage could develop in the person who smokes 3 to 5 marihuana cigarettes or "joints" a day with high concentrations of Paraquat (450 ppm) over several months.

(more)

The damage that could occur is fibrosis, a condition which reduces the capacity of the lungs to absorb oxygen. If fibrosis did occur, it would be irreversible and probably not diagnosable until after several months of smoking marihuana contaminated with high levels (450 ppm or more) of Paraquat. It should be emphasized that no lung damage has been identified from smoking Paraquat-treated marihuana.

The Paraquat contaminant itself has no odor, no known taste, and is invisible to the eye. Thus there is no way in which the heavy or casual user can be sure of its presence.

Paraquat has been used by the Mexican Government to eradicate marihuana since 1975. It is sprayed by aircraft and interacts with sunlight to cause the plants to die within about 2 days. The U.S. Government does not fund or provide the pesticide for the eradication program.

Paraquat has been used in the United States since the early 1960's and is a highly toxic and commonly used weed killer. It is approved by the EPA for weed control in fruit orchards and as an aid to harvesting mature plants such as cotton and soybeans.

The only deaths attributed to Paraquat have been from suicide or accidental poisoning from swallowing the herbicide in concentrated form.

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